

Table 5. A comparison of the existing once-through, conventional light-water reactor fuel cycle with representative advanced nuclear energy systems in the long term								
Criterion	Once-Through LWR	Once-Through w/High-Temperature Reactor	LWR Modified Open Cycle	Fast-Spectrum Reactor with Closed Fuel Cycle	Column B	Column C	Column D	Column E
Nuclear Energy Description	Clad uranium oxide fuels irradiated in LWRs with evolutionary improvements	High-temperature reactors (such as those using graphite-based fuels) capable of temperatures over 600°C operating on a once-through fuel cycle. Being pursued in DOE’s Next Generation Nuclear Plant project	Clad uranium- and mixed-oxide fuels irradiated in LWRs with evolutionary improvements. MOX fuel is irradiated once and then sent to repository.	Fast-spectrum liquid-metal-cooled reactors capable of continuous recycle of actinides				
SAFETY								
COST								
SUSTAINABILITY								
					Rating*			
Uranium	Baseline	Similar uranium requirements,	~19% reduction in	~95% + reduction in	3	4	4	4
					Weighting**			
					3			
Global climate impacts	Baseline	Potential for major reduction in carbon dioxide by using nuclear process heat in fossil-energy-intensive industries and to produce hydrogen for non-carbon-based transportation fuels	About the same as the baseline	About the same as the baseline				
					Column B	Column C	Column D	Column E
					Rating			
					3	4	3	3
					Weighting			

					4			
Energy security	Baseline	Potentially large benefit in reducing petroleum imports now used to fuel non-electricity sectors	About the same as the baseline	About the same as the baseline				
					Column B	Column C	Column D	Column E
					Rating			
					3	4	3	3
					Weighting			
					5			
	NONPROLIFERATION AND COUNTER-TERRORISM							
	WASTE MANAGEMENT							
* 1 to 5; 5= best; constant except for sensitivity analysis Numbers shown are examples only								
**Importance * 1 to 5; 5= best; constant except for sensitivity analysis Numbers shown are examples only								